



English translation of Japanese Office Action (Examiner's comments)

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The following is an excerpt of Notification of Reason(s) for Refusal of patent application No.2004-216953 that includes a description of the examiner's reasoning that underlies the refusal of the patent application.

Note (The list of cited documents etc. is shown below)

(1)

(With regard to the invention in claims 1 to 3, 14)

- Cited documents 1 to 4

Remark:

The cited document 1 describes a hydrogen permeable membrane and a method of manufacturing the hydrogen permeable membrane, wherein the hydrogen permeable membrane selectively allows hydrogen to permeate therethrough, and includes: a metal base layer containing VA group element such as vanadium (V); a metal intermediate layer that is formed on each of two surfaces of the metal base layer, and that contains selected one of nickel (Ni) and cobalt (Co); and a metal coating layer containing palladium (Pd). The metal coating layer is formed on a surface of each of the two metal intermediate layer, and the metal base layer is not formed on the surface of each of the two metal intermediate layer (refer to claims, [0017], [0040], and FIG. 3).

Also, the cited document 2 describes a composite metal membrane for hydrogen separation, which includes a hydrogen permeable non-porous base metal layer and a hydrogen permeable non-porous coating metal layer that are separated from each other by a hydrogen permeable intermediate layer. The base metal layer is made of vanadium, and the coating metal layer is made of, for example, palladium (refer to claims, [0015], and FIG. 1).

The invention described in the cited document 1 or 2 differs from the invention according to claim 1 in that the intermediate layer is not "a metal having a higher melting point than that of the metal base layer and that of the metal coating layer and possessing hydrogen permeability".

However, the technology, in which a metal having a high melting point, that is, a melting point equal to or higher than 1800 °C, for example, Ta or Nb, is provided in the

hydrogen permeable membrane as a barrier layer to prevent diffusion of metal components contained in the hydrogen permeable metal foil, is a known matter as described in the cited documents 3 and 4. Prevention of the diffusion of the metal components is a known object of the technology relating to the hydrogen permeable membrane, as well as improvement of hydrogen permeability.

Accordingly, persons skilled in the art can easily devise the technology in which a metal having a high melting point, that is, a melting point equal to or higher than 1800 °C, for example, Ta or Nb, is used, in other words, "a metal having a higher melting point than that of the metal base layer and that of the metal coating layer and possessing hydrogen permeability" is used as the intermediate layer described in the cited document 1 or 2.

(2)

(With regard to the invention in claims 4 to 6, 9)

- Cited documents 1 to 4

Remark:

Refer to the above (1). The cited document 3 describes a hydrogen permeable membrane, in which a metal having a high melting point, that is, a melting point equal to or higher than 1800 °C is used as a barrier layer. Also, in the cited document 3, an alloy made of Ta and Mo is described in the embodiment (refer to sample numbers 1 to 47 in [Table 2]). Selection of the component of the barrier layer is a design matter determined by persons skilled in the art.

Accordingly, persons skilled in the art can easily devise the technology in which the alloy made of Ta and Mo is employed as the intermediate layer described in the cited document 1 or 2.

(3)

(With regard to the invention in claims 7, 8, 10, 11)

- Cited documents 1 to 4

Remark:

Refer to the above (1) and (2). In the cited document 3, it is described that the barrier layer includes a plurality of layers. Also, in the cited document 3, it is described that it is preferable to employ, for example, an alloy made of Pd and Ag, or an alloy made of Pd and at least one metal selected from a group consisting of Y and rare-earth metals, as the hydrogen permeable metal foil (refer to claim 3, and [0009]). Obviously, it is preferable that the barrier layer of the hydrogen permeable membrane

should have a function of preventing the diffusion of the metal components and should have hydrogen permeability. Therefore, persons skilled in the art naturally examines the possibility of adding a known additive metal that increases the hydrogen permeability, to the barrier layer.

Accordingly, persons skilled in the art can easily devise the technology in which the intermediate layer described in the cited document 1 or 2 includes two layers, and vanadium, palladium, silver, yttrium, platinum, or the like is employed as the additive metal.

(4)

(With regard to the invention in claims 12 and 13)

- Cited documents 1 to 4

Remark:

Refer to the above (1) to (3). In the cited document 1, it is described that the hydrogen permeable membrane may be used in, for example, a fuel cell system or a hydrogen purification apparatus (refer to [0025]).

Also, because the technology, in which the hydrogen permeable membrane is used in the fuel cell or the hydrogen extraction apparatus, is a known technology, persons skilled in the art can easily devise the technology in which the composite metal membrane for hydrogen separation described in the cited document 2 is used for the above-described purpose.

#### The list of cited documents etc.

1. Japanese Patent Application Publication No. 2003-112020
2. Japanese Patent Application Publication No. 07-185277
3. Japanese Patent Application Publication No. 2001-286742
4. Japanese Patent Application Publication No. 2002-126474

#### Related art documents

1. Japanese Patent Application Publication No. 2004-074070

This record is not a component(s) of the reason(s) for refusal.